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CASE REPORT

Minimally invasive treatment of the cyst of the canal of Nuck with the laparoscopic total extraperitoneal approach

Ülkü Mete Ural[1], **Neriman Şengül**[2], **Elif Betül Esmer**[1], **Elif Aydın**[1], **Selma Erdoğan Düzcü**[3]

[1]Department of Obstetrics and Gynecology, Abant İzzet Baysal University Faculty of Medicine, Bolu, Türkiye
[2]Department of General Surgery, Abant İzzet Baysal University Faculty of Medicine, Bolu, Türkiye
[3]Department of Pathology, Abant İzzet Baysal University Faculty of Medicine, Bolu, Türkiye

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ABSTRACT

The cyst of the canal of Nuck (CCN) is an extremely rare pathology that occurs as a result of the inability to obliterate the processus vaginalis. No standard therapeutic procedure currently exists, and the condition remains unfamiliar to gynecologists. In this report, we aimed to discuss the treatment of CCN with a minimally invasive method. A 33-year-old woman diagnosed with the CCN was treated with a laparoscopic total extraperitoneal approach with the best postoperative recovery. Awareness of CNN is critical for appropriate diagnosis and management. The classic treatment is excision of the cyst and closure of the inguinal ring as an inguinal hernia operation. The laparoscopic total extraperitoneal approach is a minimally invasive and effective treatment method that can be applied as an alternative to classical surgical treatment.

Keywords: canal of Nuck, cyst, endometriosis, laparoscopy, total extraperitoneal approach

INTRODUCTION

The canal of Nuck (CN) is a female analog of the patent processus vaginalis in the male. The cyst of the canal of Nuck (CCN) is formed by the peritoneal pocket extending into the inguinal canal along with the round ligament, resulting from the failure of the closure of the processus vaginalis (1). Anton Nuck provided the earliest description of it in 1650 (2). In the literature a variety of definitions are used for this extremely rare condition, including female hydrocele, Nuck canal hydrocele, Nuck's diverticulum, and cyst of the canal of Nuck. The origin of this very rare disease, especially in adulthood, is rooted in embryogenesis (3).

CCN often presents clinically as a genital or groin swelling, which permits a wide range of potential diagnosis. Due to its rarity, the CCN is frequently

Corresponding author: Ülkü Mete Ural **E-mail:** ulkumete2004@yahoo.com
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misdiagnosed because most medical experts are unaware of its existence. A thorough clinical examination and sufficient radiologic imaging are required to determine a precise diagnosis. The treatment is surgical excision. The laparoscopic total extraperitoneal (TEP) approach, without an incision of the peritoneal cavity, reduces surgical trauma and hastens the healing of postoperative wounds. In this case, the successful treatment of a large CNN with the laparoscopic TEP technique is presented.

CASE REPORT

A 33-year-old female patient presented to the gynecology outpatient clinic with swelling of the left inguinal region that had persisted for the last three months. She had a surgical history of cesarean section and previous right kidney transplantation. In the physical examination, a smooth-surfaced, mobile mass of 6-7 cm in diameter expanding from the left inguinal area to the labium majus was observed (Figure 1.a). There was no difference in mass dimensions with the Valsalva maneuver. To observe the intra-abdominal relationship of the mass, computed tomography was performed and a 70×53×44 mm simple-looking, thin-walled cyst was observed outside the left inguinal canal, unrelated to the abdomen, and was evaluated as a CCN (Figure 1.b). The patient was consulted to the department of gastroenterological surgery, and it was decided to remove the cyst with the TEP technique as she had previously undergone kidney transplantation and cesarean section. The cyst capsule was completely excised by TEP approach (Figure 2.a,b). Obliteration of the inguinal canal was achieved by placing a mesh on the anterior abdominal wall and the procedure was terminated.

The histopathology report confirmed endometriosis in the cyst wall. While the cyst epithelium showed positive staining with calretinin, CD10 positive staining was seen in the stroma in the endometriosis focus, and estrogen receptor positive staining was seen in the endometrial glands (Figure 3.a,b). The patient was discharged uneventfully on the second postoperative day and her control evaluation one week later was normal. The patient signed the informed consent form and consented to the publication of her photographs.

DISCUSSION

The portion of the processus vaginalis that is found in the inguinal canal of females is known as the canal of Nuck (CN) (2). The processus vaginalis normally closes during the first year of life. Disorders of the canal most often affect young girls under the age of five (3). Even fewer cases occur in adults. Failure to completely obliterate the CN results in several diseases, including herniation of intraabdominal organs involving intestinal and genital contents, such as the uterus, fallopian tube, and ovary and hydrocele of the CN (4). The hydrocele of the CN is also called CCN.

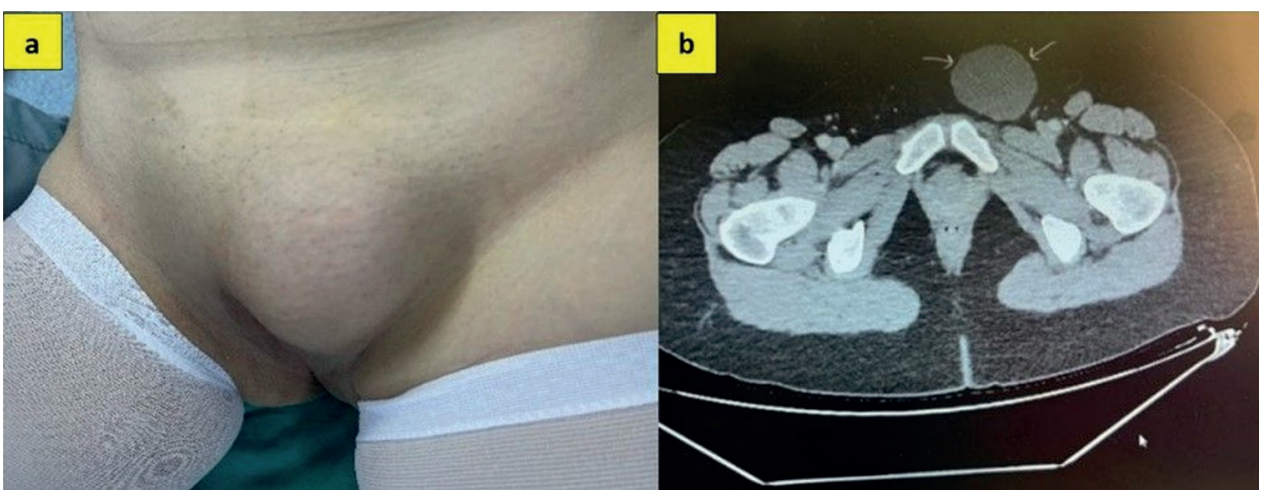

Figure 1. a: Swelling in the left groin region, **b:** Thin-walled anechoic cyst outside the inguinal canal.

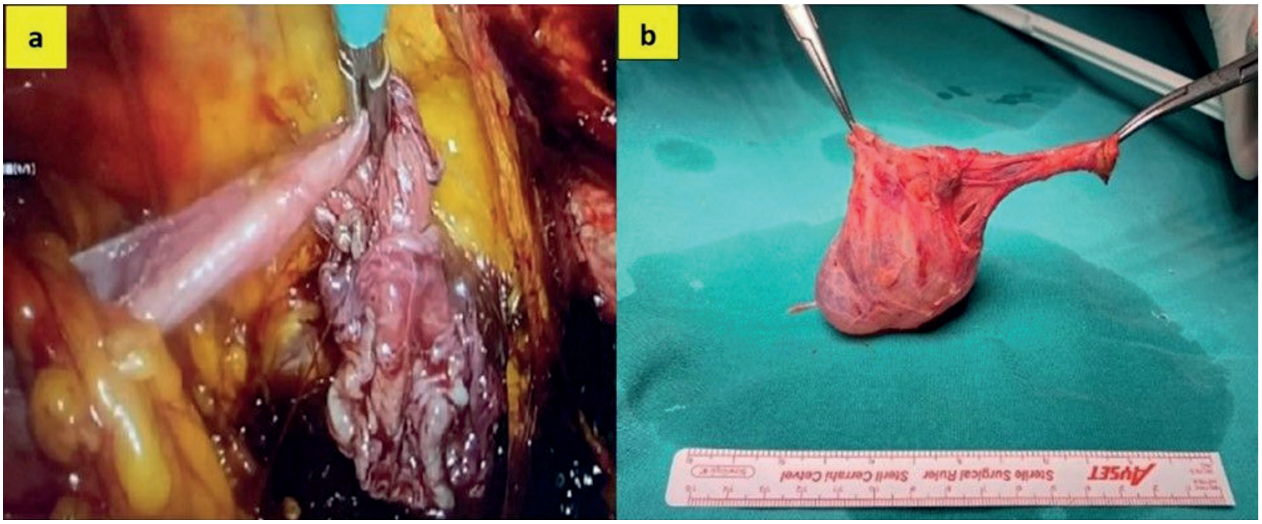

Figure 2. a: Cyst capsule stripped of round ligament, **b:** Totally excised cyst capsule.

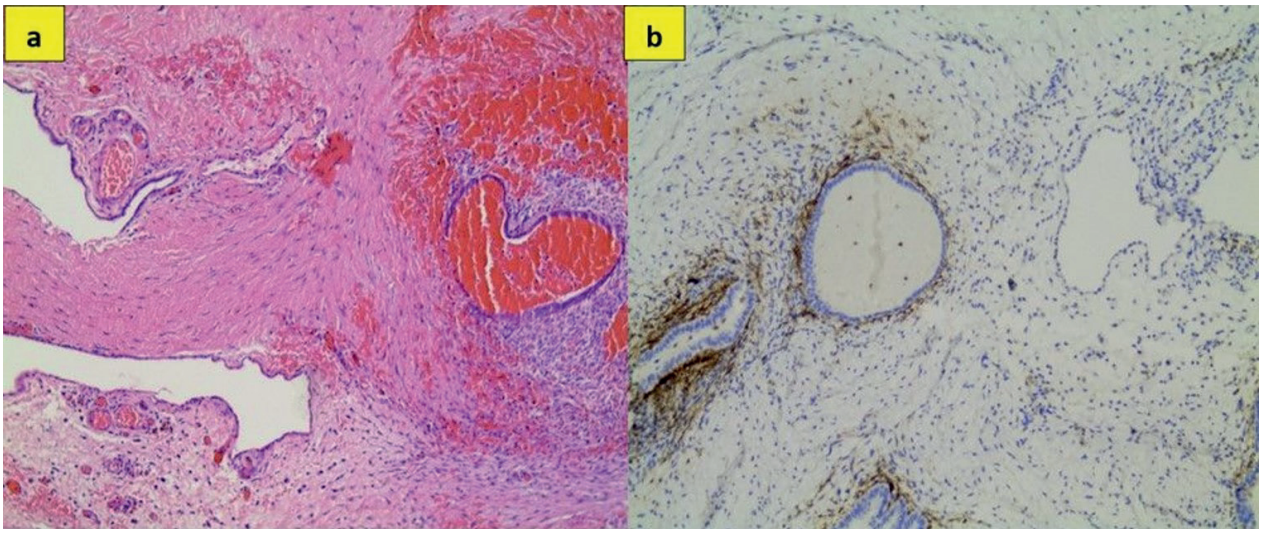

Figure 3. a: Endometriosis focus in Nuck's canal cyst wall covered with cuboidal epithelium, HEX100 (hematoxylin and eosin staining), **b:** CD10 (B Cell Development Marker) positive staining of the stroma in the focus of endometriosis, CD10X100.

Clinically, CCN may present as an inguinal mass that is either painless or painful, fluctuant, movable, and irreducible, without associated nausea or vomiting. As a result, identifying this entity solely based on clinical findings is challenging. This mass typically expands to the labia majora during the Valsalva maneuver and does not expand. Inguinal hernia is the most significant differential diagnosis for CCN. Additionally, diagnoses of lymphadenitis, lipoma, leiomyoma, sarcoma, cyst, and abscess should be taken into account (4). Endometriosis has also been reported in cases of CN, which is relatively uncommon and makes diagnosis difficult in many instances. The possibility of endometrial tissue seeding in CN is extremely rare. To the best of our knowledge, very few cases of endometriosis of the CN have been documented in the literature (5-7). Cancer development that originated from endometriosis in the CN has also been reported

(6). In our case, endometriotic lesions that had developed in the CN were detected.

Due to the extreme rarity of CCN, there is still no established standard of a therapeutic procedure, and professionals are unfamiliar with the disorder. Excision of the hydrocele and closure of the enlarged inguinal ring are the suggested treatment options. A conventional open anterior technique is typically used to accomplish this through the inguinal canal. Over the past decade, the laparoscopic approach to inguinal hernia treatment has advanced quickly. The laparoscopic TEP procedure is an effective, minimally invasive method for treating hernias that doesn't require entering the peritoneal cavity (8).

The TEP technique is considered a popular laparoscopic method that can also be used in the treatment of CCN (9). The use of TEP approach in the surgical treatment of CCN is very rare in the literature (10). Gynecologists have limited experience with the anatomy of the inguinal canal and the laparoscopic total extraperitoneal approach to this region. Collaborating with general surgeons who use the TEP technique extensively and following technological developments can provide advances in patient management. A concomitant inguinal hernia can occur in about one-third of patients with a CCN, necessitating simultaneous repair (5). It is possible to treat the inguinal hernia concurrently during the CCN excision.

Since there is no intervention to the peritoneum in the laparoscopic TEP approach, patients recover faster and experience fewer recurrences than those who undergo standard anterior surgery (9). After the cyst is removed surgically, it's crucial to cover the canal with mesh to prevent recurrence and hernia development (10). With the TEP technique, mesh placement can also be achieved practically (8).

Laparoscopic TEP repair shortens the length of the procedure, reduces bleeding volume, improves intraoperative indices, diminishes postoperative discomfort, lowers the risk of infections and sequelae, causes less damage to normal tissues, promotes better postoperative recovery, and leads to a shorter hospital stay. This technique provides convenience in cases of recurrent inguinal hernia and in obese patients. It has excellent potential for clinical advancement (9).

Disadvantages of the TEP technique include technical challenges due to the unfamiliar pelvic anatomy and the small working area, prior surgeries, and a long learning curve. Because of the restricted view of the inguinal anatomy, the distal end of the cyst removal is difficult and necessitates specialized knowledge, practice, and experience for the laparoscopic TEP approach (10). Although the cyst was completely outside of the inguinal canal towards the labia majora, because of the history of two previous surgeries in our case, it was completely removed by applying the successful TEP procedure.

CCN should be kept in mind in the differential diagnosis of women with a mass in the inguinal region, and the TEP technique is an effective and minimally invasive method that should be considered as an alternative in the surgical treatment of these patients.

Ethical approval

Written informed consent was obtained from the participants.

Author contribution

Surgical and Medical Practices: UMU, NŞ; Concept: UMU, NŞ; Design: UMU, NŞ; Data Collection or Processing: EBE, EA; Literature Search: UMU, SED; Writing: UMU, EBE. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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